

What we claim is:

1. A balloon catheter comprising:

an elongate shaft having a distal region and a proximal region and defining a lumen therebetween; and

an inflatable balloon disposed over a portion of the distal region of the elongate shaft, the balloon having distal and proximal portions and distal and proximal ends;

wherein the balloon is configured to expand to a first expansion configuration when a first amount of fluid is inserted into the balloon, and to expand to a second expansion configuration when a second, greater, amount of fluid is inserted into the balloon; wherein when the balloon is in the first expansion configuration, the distal portion of the balloon is expanded to the first diameter and the proximal portion of the balloon is in a collapsed configuration.

2. The balloon catheter of claim 1, wherein a first diameter of the expanded balloon in the first expansion configuration is substantially the same as a second diameter of the expanded balloon in the second expansion configuration.

3. The balloon catheter of claim 1, wherein a length of the expanded distal portion of the balloon is approximately one half a total length of the balloon.

4. The balloon catheter of claim 1, wherein when the balloon is in the second expansion configuration, the proximal portion of the balloon is also expanded from the collapsed configuration.

5. The balloon catheter of claim 1, wherein the proximal portion of the balloon is thicker than the distal portion of the balloon.

6. The catheter of claim 1, wherein the proximal portion of the balloon is releasably attached to the shaft.

7. The catheter of claim 6, wherein the proximal portion of the balloon and shaft are heated to releasably attach the proximal portion to the shaft.

8. The catheter of claim 6, wherein the proximal portion of the balloon is releasably attached to the shaft with a releasable adhesive.

9. The catheter of claim 1, wherein the balloon comprises a highly compliant material such that the balloon elastically expands at an inflation pressure of less than 1.0 ATM.

10. The catheter of claim 1, further comprising radiopaque markers disposed on the shaft.

11. The catheter of claim 10, wherein a first marker is disposed adjacent the distal end of the balloon, a second marker is disposed adjacent the proximal end of the balloon and a third marker is disposed between the first and second markers.

12. The catheter of claim 6, wherein the proximal portion of the balloon is releasably attached to the shaft at one or more discrete locations.

13. The catheter of claim 1, further comprising a sheath overlying the proximal portion of the balloon, the sheath being configured to impede the expansion of the proximal portion of the balloon.

14. The catheter of claim 13, wherein the sheath is made of an elastomeric material.

15. The catheter of claim 13, wherein the sheath is attached to the shaft proximally of the balloon.

16. The catheter of claim 13, wherein the sheath is bonded to the proximal portion of the balloon.

17. The catheter of claim 1, wherein the elongate shaft comprises a multi-lumen catheter.

18. The catheter of claim 17, wherein the elongate shaft has an outer layer extending from the proximal region of the shaft to proximal of a distal end of the shaft, and an inner layer extending from the proximal region of the shaft to the distal end of the

shaft; wherein the inner layer defines a first lumen and the outer layer defines a second lumen.

19. The catheter of claim 18, wherein the balloon is disposed on the shaft such that the distal end of the balloon is attached to the inner layer of the shaft, the proximal end of the balloon is attached to the outer layer of the shaft, and the proximal portion of the balloon is releasably attached to a distal region of the outer layer of the shaft; wherein the second lumen is in fluid communication with an interior of the balloon.

20. The balloon catheter of claim 19, wherein the proximal portion of the balloon is thicker than the distal portion of the balloon.

21. The catheter of claim 1, wherein the elongate shaft has one or more inflation ports located in the distal region; wherein the inflation ports provide fluid communication between the lumen and an interior of the balloon.

22. The catheter of claim 21, wherein the balloon is disposed on the elongate shaft such that the distal end of the balloon is attached distal of the inflation ports and the proximal end of the balloon is attached proximal of the inflation ports.

23. The catheter of claim 22, wherein the balloon is attached such that the distal portion of the balloon overlies the inflation ports and the proximal portion of the balloon overlies a solid part of the shaft.

24. The catheter of claim 23, wherein the proximal portion of the balloon is releasably attached to the solid part of the shaft.

25. The catheter of claim 24, wherein the proximal portion of the balloon and shaft are heated to releasably attach the proximal portion to the shaft.

26. The catheter of claim 25, wherein the proximal portion of the balloon is releasably attached to the shaft with a releasable adhesive.

27. The catheter of claim 21, further comprising a guidewire disposed in the lumen; the shaft further having a seal at a distal end through which the guidewire is inserted, forming a fluid seal around the guidewire.

28. A catheter assembly comprising:  
an elongate shaft having a distal region and a proximal region and a lumen disposed therebetween;  
an expandable balloon disposed about the distal region of the shaft;  
wherein the balloon is configured such that as an inflation fluid is inserted into the balloon, the balloon is expanded from a completely collapsed configuration to a partially inflated configuration and then to fully inflated configuration; wherein a diameter of the balloon in the partially inflated configuration is substantially the same as a diameter of the balloon in the fully inflated configuration.

29. The catheter assembly of claim 28, wherein in the partially inflated configuration a first portion of the balloon is inflated while a second portion of the balloon remains uninflated, and in the fully inflated configuration, both the first and second portions of the balloon are inflated.

30. The catheter assembly of claim 29, wherein the second portion of the balloon is thicker than the first portion of the balloon.

31. The catheter assembly of claim 28, wherein the balloon has first and second ends bonded to the shaft; wherein the second portion of the balloon is releasably attached to the shaft.

32. The catheter assembly of claim 31, wherein the second portion of the balloon and the shaft are heated to releasably attach the second portion to the shaft.

33. The catheter assembly of claim 31, wherein the second portion of the balloon is releasably attached to the shaft with a releasable adhesive.

34. A balloon catheter comprising:  
an elongate shaft having a distal region and a proximal region and defining a lumen therebetween; and

an inflatable balloon disposed over a portion of the distal region of the elongate shaft, the balloon having a first longitudinal portion and a second longitudinal portion and distal and proximal ends;

wherein the balloon is configured for the first longitudinal portion to expand to a first expansion configuration when a first amount of fluid is inserted into the balloon, and for the second longitudinal portion to expand when a second, greater, amount of fluid is inserted into the balloon.

35. The balloon catheter of claim 34, wherein when the balloon is in the first expansion configuration, the first longitudinal portion of the balloon is expanded and the second longitudinal portion of the balloon is in a collapsed configuration.

36. The balloon catheter of claim 34, wherein the second longitudinal portion of the balloon is thicker than the first longitudinal portion of the balloon.

37. The catheter of claim 34, wherein the second longitudinal portion of the balloon is releasably attached to the shaft.

38. The catheter of claim 37, wherein the second longitudinal portion of the balloon and shaft are heated to releasably attach the proximal portion to the shaft.

39. The catheter of claim 37, wherein the second longitudinal portion of the balloon is releasably attached to the shaft with a releasable adhesive.

40. The catheter of claim 37, wherein the second longitudinal portion of the balloon is releasably attached to the shaft at one or more discrete locations.

41. The catheter of claim 34, further comprising a sheath overlying the second longitudinal portion of the balloon, the sheath being configured to impede the expansion of the second longitudinal portion of the balloon.

42. The catheter of claim 41, wherein the sheath is made of an elastomeric material.

43. The catheter of claim 41, wherein the sheath is attached to the shaft proximally of the balloon.

44. The catheter of claim 41, wherein the sheath is bonded to the second longitudinal portion of the balloon.